

Our Ref: MOA – 1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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In re Application of: Atsuji NAKAGAWA, et al.
International Application No. PCT/JP2004/014155
U.S. Application No.: UNKNOWN AT THIS TIME
Filing Date: UNKNOWN AT THIS TIME
Title: HIGH VOLTAGE DISCHARGE LAMP LIGHTING
METHOD, LIGHTING APPARATUS, AND IMAGE
DEVICE USING THAT LIGHTING APPARATUS

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June 2, 2006

PRELIMINARY AMENDMENT

Hon. Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22312-1450

S i r:

This Preliminary Amendment is filed concurrently with the filing of the above-identified Application. Attached hereto, starting on a separate page, are Amendments to the Claims and Remarks.

AMENDED CLAIMS

Claims 1-15 (cancelled)

Claim 16 (new): A method of lighting a high pressure discharge lamp, comprising the steps of:

(a) reducing power to be supplied to electrodes of the lamp to an extent an arc discharge is not extinguished so that the lamp temperature reaches an equilibrium temperature at a transition state of making transition from a lighted state to light off; and

(b) cutting the power supply to the electrodes at the point the lamp temperature reaches the equilibrium temperature.

Claim 17 (new): A method of lighting a high pressure discharge lamp used as a light source of an image equipment, comprising the steps of:

(a) making a state in which an image does not appear on a screen by switching OFF the image equipment;

(b) reducing power to be supplied to electrodes of the lamp to a extent an arc discharge is not extinguished until the lamp temperature reaches an equilibrium temperature in a transition state of making transition from a lighted state to light off; and

(c) cutting the power supply to the electrode at a point the lamp temperature reaches the equilibrium temperature.

Claim 18 (new): The method of lighting the high pressure discharge lamp according to claim 16 or 17 wherein the reducing amount of the power is $1/2$ to $1/20$ of a rated power.

Claim 19 (new): The method of lighting the high pressure discharge lamp according to 16 or claim 17, wherein the reduction time of the reduced power is greater than or equal to 60 seconds.

Claim 20 (new): A method of lighting a high pressure discharge lamp, comprising the steps of:

- (a) reducing power to be supplied to electrodes of the lamp to a extent an arc discharge is not extinguished for a while (period (t₂)) in a transition state of making transition from a lighted state to light off;
- (b) making transition to a glow discharge;
- (c) maintaining for a while (period (t₃)); and
- (d) cutting the power supply to the electrodes.

Claim 21 (new): A method of lighting a high pressure discharge lamp used as a light source of image equipment, comprising the steps of:

- (a) making a state in which an image does not appear on a screen by switching OFF the image equipment;
- (b) reducing power to be supplied to electrodes of the lamp to an extent an arc discharge is not extinguished for a while (period (t₂));
- (c) making transition to a glow discharge;
- (d) maintaining for a while (period (t₃)); and
- (e) cutting the power supply to the electrodes.

Claim 22 (new): The method of lighting the high pressure discharge lamp according to claim 20 or 21, wherein the reducing amount of the power is $1/2$ to $1/20$ of a rated output, and the power after reduction is constant, or reduced a stepwise manner with time, or reduced continuously with time.

Claim 23 (new): The method of lighting the high pressure discharge lamp according to claim 20 or 21, wherein the reduction time (t₂) of the reduced power is 20 to 240 seconds.

Claim 24 (new): The method of lighting the high pressure discharge lamp according to claim 20 or 21, wherein:

- (a) the reducing amount of the power is $1/2$ to $1/20$ of a rated output;
- (b) the power after reduction is constant, or reduced a stepwise manner with time, or reduced continuously with time; and
- (c) the reduction time(t_2) of the reduced power is 20 to 240 seconds.

Claim 25 (new): The method of lighting the high pressure discharge lamp according to claim 20 or 21, wherein the glow discharges maintaining time (t_3) is 10 to 120 seconds.

Claim 26 (new): The lighting method of the high pressure discharge lamp according to claim 20 or 21, wherein:

- (a) reducing amount of the lamp power is $1/2$ to $1/20$ of a rated output;
- (b) the power after reduction is constant, or reduced a stepwise manner with time, or reduced continuously with time; and
- (c) the glow discharge maintaining time (t_3) is 10 to 120 seconds.

Claim 27 (new): The method of lighting the high pressure discharge lamp according to Claim 20 or 21, wherein:

- (a) the reduction time(t_2) of the reduced power is 20 to 240 seconds; and
- (b) the glow discharge maintaining time (t_3) is 10 to 120 seconds.

Claim 28 (new): A lighting device of a high pressure discharge lamp, comprising:

- (a) a lighting starter circuit for starter lighting by applying a high voltage pulse or a low voltage of direct current to the high pressure discharge lamp;
- (b) a stable lighting circuit, connected to the lighting starter circuit, for stably lighting the high pressure discharge lamp;
- (c) a power controller for controlling the power supply from the stable lighting circuit to the high pressure discharge lamp;
- (d) a lamp power reducing control circuit for having the power controller control the stable lighting circuit so that a stable supply of the lighting power from the stable

lighting circuit to the high pressure discharge lamp is performed in stable lighting, and control the stable lighting circuit so as to lower the power to be supplied to the high pressure discharge lamp to a power of an extent an arc discharge between electrodes is not extinguished in a transition state when the high pressure discharge lamp makes transition from the stable lighting to light off after switching OFF the image equipment; and

(e) an optical engine control circuit for outputting an image OFF signal to an optical engine for sending images to a screen so as to have the screen in a state in which the image does not appear at the same time as the switch OFF.

Claim 29 (new): A device of lighting a high pressure discharge lamp, comprising:

(a) a lighting starter circuit, connected to the high pressure discharge lamp, for starter lighting by applying a high voltage pulse starting voltage or a direct current starting voltage to the high pressure discharge lamp;

(b) a stable lighting circuit, connected to the lighting starter circuit, for stably lighting the high pressure discharge lamp;

(c) a power controller, connected to the stable lighting circuit, for controlling the power supply from the stable lighting circuit to the high pressure discharge lamp;

(d) a lamp power reducing circuit, connected to the power controller, for having the power controller control the stable lighting circuit so that a stable supply of the lighting power from the stable lighting circuit to the high pressure discharge lamp is performed in stable lighting, and control the stable lighting circuit so as to lower the power to be supplied to the high pressure discharge lamp to power of an extent an arc discharge between electrodes is not extinguished in a first half of a transition state of when the high pressure discharge lamp makes transition from the stable lighting to light off;

(e) a glow discharge maintaining circuit, connected to the high pressure discharge lamp, for making transition the high pressure discharge lamp to glow discharge in a second half of the transition state and maintaining the glow discharge after transition; and

(f) a glow discharge control circuit, connected to the glow discharge

maintaining circuit, for maintaining the glow discharge and cutting the power supply to the electrodes after maintaining the glow discharge.

Claim 30 (new): The device of lighting the high pressure discharge lamp according to claim 28, wherein the high voltage pulse starting voltage is 10kV to 15kV.

Claim 31(new): The device of lighting the high pressure discharge lamp according to claim 28; wherein the direct current starting voltage is 1kV to 4kV.

Claim 32 (new): An image equipment, comprising:

- (a) a screen for showing an image;
- (b) an optical engine for projecting the image on the screen;
- (c) a high pressure discharge lamp for supplying light to the optical engine;
- (d) a lighting starter circuit for applying the starter lighting voltage to the high pressure discharge lamp and a stable lighting circuit for supplying a stable lighting power to the high pressure discharge lamp in stable lighting;
- (e) an optical engine control circuit for controlling the optical engine with switching OFF of the image equipment to have the screen in a state in which an image does not appear; and
- (f) a lamp power reducing circuit for turning OFF the high pressure discharge lamp at a point the high pressure discharge lamp has reached the equilibrium temperature due to cooling after the switch OFF or after an elapse of a suitable time in which the high pressure discharge lamp is assumed to have reached the equilibrium temperature.

Claim 34 (new): An image equipment, comprising:

- (a) a screen arranged in the image equipment for showing a image;
- (b) an optical engine for projecting the image on the screen;
- (c) a high pressure discharge lamp for supplying light to the optical engine;
- (d) a lighting starter circuit, connected to the high pressure discharge lamp, for applying the starter lighting voltage to the high pressure discharge lamp;
- (e) a stable lighting circuit, connected to the lighting starter circuit, for supplying a stable lighting power to the high pressure discharge lamp in stable lighting of the high pressure discharge lamp;
- (f) a power controller, connected to the stable lighting circuit, for controlling the power supply from the stable lighting circuit to the high pressure discharge lamp;
- (g) an optical engine control circuit, connected to an optical engine, for controlling the optical engine by switching OFF of the image equipment to have the screen in a state in which an image does not appear;
- (h) a lamp power reducing circuit, connected to the power controller, for reducing the power to an extent an arc discharge is not extinguished by cooling the lamp after the switch OFF and maintaining the arc discharge for a while (period(t₂));
- (i) a glow discharge maintaining circuit, connected to the high pressure discharge lamp, for making transition from the arc discharge by the reduced power to the subsequent glow discharge and maintaining the glow discharge; and
- (j) a glow discharge control circuit, connected to the glow discharge maintaining circuit, for controlling the glow discharge maintaining circuit and cutting the current supply to the electrodes after maintaining the glow discharge for a while (period(t₃)).

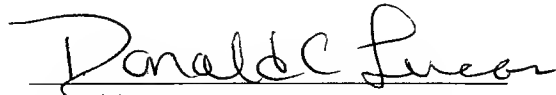
REMARKS

This Preliminary Amendment cancels claims 1 – 15. Claims 16 – 34 are added hereto and present the subject matter of claims 1 – 15 in the more conventional U.S. format.

Should any fees be necessary in order to maintain this Application in pending condition, appropriate requests are hereby made and authorization is given to debit account # 02-2275.

Respectfully submitted,

LUCAS & MERCANTI, LLP

A handwritten signature in black ink, reading "Donald C. Lucas". The signature is fluid and cursive, with the first name "Donald" and last name "Lucas" clearly legible.

Donald C. Lucas, Reg. # 31,275

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